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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/933,050   | 08/20/2001  | Markus Doetsch       | L&L-I0188           | 6723             |
| 24131  | 7590        | 09/13/2004           | EXAMINER            |                  |
| LERNER AND GREENBERG, PA<br>P O BOX 2480<br>HOLLYWOOD, FL 33022-2480 |             |                      | PATHAK, SUDHANSHU C |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2634                |                  |

DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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|                              |                     |                |  |
|------------------------------|---------------------|----------------|--|
| <b>Office Action Summary</b> | Application No.     | Applicant(s)   |  |
|                              | 09/933,050          | DOETSCH ET AL. |  |
|                              | Examiner            | Art Unit       |  |
|                              | Sudhanshu C. Pathak | 2634           |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on August 20<sup>th</sup>, 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on August 20<sup>th</sup>, 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. Claims 1-to-11 are pending in the application.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 (Method) & 7 (Apparatus) are rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al. (5,214,675) in view of Wood et al. (5,488,560).

Regarding to Claims 1 & 7, Mueller discloses a method and apparatus for equalizing and decoding data signals (abstract, lines 1-9 & Fig. 5, elements 448, 544) comprising receiving a radio signal containing an error-protection-coded data signal transmitted over a radio channel, the data signal being error-protection coded at a transmitter end (Fig.'s 1-2 & abstract, lines 1-9 & Column 1, lines 11-27 & Column 3, lines 63-68 & Column 4, lines 1-9 & Column 6, lines 45-68); sampling the radio signal received to generate a digital input data signal (Fig. 2, element 134 & Fig. 5, element 424 & Fig. 6, element 624 & Fig. 7, element 824 & Column 5, lines 45-62 & Column 8, lines 15-25); feeding the digital input data signal to an adaptive equalizer having a first channel estimator which repeatedly determines first channel parameters of the radio channel, the adaptive equalizer uses the first channel parameters

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to calculate and output an equalized data signal (Fig. 5, element 448 & Fig. 6, element 648 & Fig. 7, element 840 & Fig. 8, element 1040 & Column 14, lines 3-11 & Column 15, lines 21-45 & Column 16, lines 40-53 & Column 17, lines 48-62); feeding the equalized data signal to a second channel estimator which repeatedly calculates second channel parameters including a variance of radio channel noise (Fig. 5, element 528 & Fig. 6, element 728 & Fig. 7, element 922 & Fig. 8, element 1124 & Column 14, lines 35-62 & Column 15, lines 65-68 & Column 16, lines 3-17 & Column 17, lines 5-30 & Column 18, lines 20-32); feeding the second channel parameters to a decoder to be used as computing parameters in the decoding for calculating a decoded output signal (Fig. 5, element 540 & Fig. 6, element 740 & Fig. 7, element 934 & Fig. 8, element 1136 & Column 14, lines 35-62 & Column 16, lines 3-17 & Column 17, lines 5-30 & Column 18, lines 20-32); and decoding the equalized data signal in the decoder to determine the decoded output signal which is a reconstruction of an initial input signal on which the error-protection-coded data signal is based (Fig. 5, element 544 & Fig. 6, element 744 & Fig. 7, element 938 & Fig. 8, element 1140 & Column 14, lines 35-62 & Column 16, lines 3-17 & Column 17, lines 5-30 & Column 18, lines 20-32). However, Muller does not disclose calculate the damping factor of the radio channel using a method of moments.

Wood discloses a method and apparatus for system identification and equalization so as to be less sensitive to noise (abstract, lines 1-23 & Fig. 1 & Fig. 4 & Column 1, lines 1-25, 50-67 & Column 2, lines 1-15 & Column 3,

lines 40-57). Wood also discloses the control system to include an identification means to calculate the damping factor and the oscillation period (Column 2, lines 45-55). Wood also discloses the estimation of the damping factor using the method of moments (Fig. 3a & Fig. 4, element 60 & Column 3, lines 40-58 & Column 11, lines 25-35 & Column 13, lines 1-50 & Column 14, lines 55-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Wood teaches a process control system for system identification comprising the calculation and estimation of the damping factor, from the measured parameters, using the method of moments techniques, and this can be implemented in the channel estimator so as to compute the damping factor of the radio channel, thus reducing the sensitivity of the calculation to the characteristic noise, thus satisfying the limitation of the claims.

4. Claims 2-5 (Method) & 8-11 (Apparatus) are rejected under 35 U.S.C.

103(a) as being unpatentable over Mueller et al. (5,214,675) in view of Wood et al. (5,488,560) in further view of Raphaeli et al. (D. Raphaeli, Y. Zarai; Combined Turbo Equalization and Turbo Decoding; IEEE Communications Letters; Vol. 2, No. 4; April 1998; Pages 107-109).

Regarding to Claims 2-5 & 8-11, Mueller in view of Wood discloses a method and apparatus for equalizing and decoding data signals comprising receiving a radio signal containing an error protection coded data signal over a radio channel; sampling the received signal; feeding the digital signal to an adaptive equalizer further comprising a first channel estimator and feeding the

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equalized signal to a second channel estimator calculating the damping factor of the radio channel using the method of moments as described above.

However, Mueller in view of Wood does not disclose coding and decoding the data signals on a turbo code.

Raphaeli discloses a method and apparatus for turbo encoding and decoding data signal in the presence of an intersymbol interference channel (Page 107, Abstract, lines 1-11 & Page 107, Left Column, Introduction, lines 1-15 & Page 107, Right Column, Introduction, lines 1-11 & Page 107, Right Column, System Model, The Decoder & Fig.'s 1-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Raphaeli discloses a turbo encode / decoder implemented in a radio communication channel and this can be implemented in the system as described in Muller in view of Wood so as to provide a high coding gain and to achieve near capacity performance thus satisfying the limitations of the claims.

5. Claim 6 (Method) & 12 (Apparatus) are rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al. (5,214,675) in view of Wood et al. (5,488,560) in further view of Baier et al. (5,970,060).

Regarding to Claim 6 & 12, Mueller in view of Wood discloses a method and apparatus for equalizing and decoding data signals comprising receiving a radio signal containing an error protection coded data signal over a radio channel; sampling the received signal; feeding the digital signal to an adaptive equalizer further comprising a first channel estimator and feeding the

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equalized signal to a second channel estimator calculating the damping factor of the radio channel using the method of moments as described above.

However, Mueller in view of Wood does not disclose carrying out one of linear zero-forcing block equalization and linear minimum mean square error block equalization on the digital input signal.

Baier discloses carrying out one of linear zero-forcing block equalization (ZF-BLE) and linear minimum mean square error block equalization (MMSE-BLE) on the digital input signal (Fig. 5 & Column 2, lines 63-67 & Column 3, lines 1-13 & Column 17, lines 10-56 & Column 18, lines 30-37 & Claims 9-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Baier teaches carrying out one of ZF-BLE and MMSE-BLE on the digital data signals and this can be implemented in the system as described in Muller in view of Wood so as to be able to receive and decode and provide a low coded bit error rate even when a low signal-to-noise ratio is present, thus satisfying the limitations of the claims.

### ***Conclusion***


1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhanshu C. Pathak whose telephone number is (571)-272-3038. The examiner can normally be reached on M-F: 9am-6pm.

- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571)-272-3056

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- The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.
- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sudhanshu C. Pathak



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